Numerical approach of the natural convection in the annular space delimited by two horizontal eccentric cylinders: relative eccentricity effect

Résumé

Mots clés:

Abstract

The authors propose in this work, the numerical study of the phenomenon of the natural laminar permanent convection in an annular space, situated between two horizontal eccentric cylinders and tilted of an angle α compared to the horizontal one. The enclosure considered is of practical interest (Storage, Isolation). The annular space is filled by a Newtonian and incompressible fluid. The number of Prandtl is fixed at 0.7 (case of the air) but the number of Grashof varies. By using the approximation of Boussinesq and the vorticity-stream function formulation, the flow is modeled by the differential equations with the derivative partial: the equations of continuity and the momentum are expressed in a frame of reference known as "bicylindrical", to facilitate the writing of the boundary conditions and to transform the curvilinear field into a rectangular one. They examine the effect of the Grashof number, the parietal thermal conditions and tilt of the system.

Keywords: natural convection/ annular space/bicylindrical coordinates/ vorticity-stream function formulation

C. GHERNOUG
M. DJEZZAR

Department of Physics
Energetic Physics Laboratory
University Mentouri Constantine
Algeria

ملخص

الكلمات المفتاحيـــة :